

CHOLERA

(From Appleton's New Encyclopedia)





tempt that he was dismissed and banished to his estate at Chanteloup. The regard in which he was held followed him to his place of exile, and his friends resorted thither to pay their respects to the fallen minister. He had endeavored, but in vain, to prevent the partition of Poland, and when the event took place Louis XV. said, "This would not have been if Choiseul had been minister." He died childless, and notwithstanding his income from his offices, and the large fortune brought him by his wife, the daughter of the wealthy financier Crozat, he was in debt to such an amount that all his estates were barely sufficient to satisfy his creditors.

II. Claude Antoine Gabriel, duke de, a peer of France, nephew and protégé of the preceding, born in 1762, died in Paris, Dec. 2, 1838. As colonel of dragoons, in 1791, he was active in preparing the flight of Louis XVI. and the royal family. On the failure of this attempt he was arrested, but recovered his liberty by the amnesty granted on the acceptance of the constitution by the king. Appointed first gentleman usher to the queen, he attended her until her imprisonment, and left France only when a price was set upon his head. Raising a regiment of hussars, he joined the royalist army, was taken prisoner, escaped, embarked for India, was wrecked on the coast of France, arrested and sentenced to death by the directory, but saved by the revolution of the 18th Brumaire. He kept aloof from public life during the reign of Napoleon, but on the restoration he was appointed a member of the new chamber of peers. He refused to sentence Ney to death, pleaded for Gen. Merlin, implicated in a conspiracy, resigned on the advent of the Villèle ministry, in 1820, the rank of major general of the national guard, and when the revolution of 1830 broke out, he was without his knowledge nominated, with Gérard and Lafayette, a member of the provisional government. He was afterward appointed aide-de-camp to Louis Philippe.

CHOISEUL-GOUFFIER, Marie Gabriel Florent Auguste, count de, a French classical scholar, born in Paris, Sept. 27, 1752, died June 20, 1817. He studied under the direction of Barthélemy, travelled several years in Greece, and in 1782 published the first volume of his *Voyage pittoresque en Grèce*. He was then made ambassador at Constantinople. On the outbreak of the revolution he adhered to the king, and was proscribed by the revolutionary government. He retired to Russia, where he was intrusted with the direction of the academy of fine arts and the imperial libraries. In 1802 he returned to France. The second part of his great work was published in 1809; the last part did not appear till after his death, in 1824.

CHOISY, François Timoléon de, a French writer, born in Paris in 1644, died Oct. 2, 1724. His delicate appearance induced his mother to dress him in feminine attire; he continued to wear it for many years, and was in the early part of his life notorious for his dissolute habits. In

1676 he accompanied the cardinal de Bouillon to Rome to attend the election of Pope Innocent XI. In 1685 he went on a mission to the king of Siam, of which he has given an interesting account. On his return to France he devoted his whole time to literary pursuits, was elected to the academy in 1687, wrote the history of several French kings, and attempted to present the annals of the church in a more accessible form than the learned Fleury. His *Mémoires pour servir à l'histoire de Louis XIV.*, which have been printed in Michaud's *Collection de mémoires*, and his *Journal du voyage de Siam fait en 1685 et 1686*, are written in a lively and agreeable style.

CHOKO DAMP, the name given by miners to the irrespirable gas (carbonic acid) which fills the mine after an explosion of fire damp. This gas is also found in badly ventilated parts of mines, its presence being detected by the difficulty of making candles burn, and the violent headaches it brings upon those who remain for any time where it is abundant. When carbonic oxide is present, the gas is exceedingly dangerous to breathe for an instant; but one may sometimes stay with safety for a minute or two in an atmosphere of choke damp in which a candle cannot be lighted.

CHOLERA, a term used to designate a variety of diseases characterized by profuse discharges from the stomach and bowels upward, but more especially downward, and in their extreme stages by cramps, absence of the pulse, coldness and blueness of the skin, and suppression of urine. The name has generally but erroneously been derived from Gr. *χολή* and *ῥέω*, signifying a flow of bile; but it properly and more appropriately comes from *choléra*, a rain-gutter, as marking the fluidity, rapidity, and copiousness with which the discharges take place. The principal varieties are: 1. Cholera morbus, or that induced by the use of indigestible food, unripe fruits, spoiled meats, mouldy or corrupt provisions, blighted grain, cucumbers, melons, fat pork, stale crabs, lobsters, shell fish, incompletely fermented or sour liquors, bad drinking water, &c. The indications are to empty the stomach and bowels of the offending substances, and then to give an anodyne. 2. Catarrhal or serous cholera, produced by sudden check of perspiration, exposure to cold while heated, &c. The indication is to reproduce heat of the skin by warm clothing, warm drinks, &c. 3. Bilious or common cholera, produced in hot weather and by gross and luxurious feeding, &c. The indications are to evacuate the excessive and unhealthy bile, and then check its further secretion. 4. Anabillous cholera, in which the biliary secretion is much diminished or entirely suspended, or else is of a very light color, dirty white, almost colorless, or milky, and when abundant resembling the rice water evacuation of epidemic cholera. The indication is to restore the healthy secretion of bile. 5. Cholera infantum, a disease of warm sea-

sons, commencing with the first heats of summer, affecting almost exclusively infants and children in large towns and cities, prevailing in the parts most densely populated, and being most virulent in crowded courts and alleys, where the ventilation is very imperfect and the inhabitants most unclean. In fact it arises from a combination of hot weather and the impure air of cities, aided largely by bad food and poor milk. It somewhat approaches septic cholera in its nature. 6. Septic cholera, arising from the inhalation of air charged with organic impurities springing from decomposing vegetable and animal matter, sewer gases, and night soil. 7. True Asiatic cholera, a virulent form of septic cholera, always originating in Hindostan, and which, like the contagious forms of influenza, dysentery, or erysipelas, has become portable, communicable, and capable of reproducing itself in every body in which it gets lodgment. Hippocrates, 400 B. C., makes remarks about cholera which scarcely allow us to doubt of the conveyance of the Asiatic disease to Greece in that early period. Aræteus of Cappadocia, A. D. 50, gives a correct description of it, even describing the spasms, coldness of the body, loss of voice, and suppression of urine. Galen in A. D. 131, and Cælius Aurelianus in 151, did the same; also Orabasius of Pergamus (230); while Alexander of Tralles (525) speaks of the watery evacuations, suppression of pulse and urine, followed in some cases by secondary typhoid fever, or death in a few hours.—When the French and English struggled for the Coromandel coast of India, repeated epidemics were noticed near Madras and Pondicherry, in connection with the great Hindoo pilgrimages. The year 1756 marks the recognition of periodically returning 12-yearly epidemics, connected with the great 12-yearly Hindoo festivals at the great temples. The great 12-yearly epidemics of 1756, 1768, and 1781 have been well described by Paisley, Girdlestone, Curtis, Sonnerat, Fra Bartolomeo, Papin, Davis, and others. On March 22, 1781, 5,000 English troops under Col. Pearse, marching near Ganjam, not far from the great temple of Juggernaut, and very shortly after the huge 12-yearly festival had taken place, were attacked by the disease very suddenly and with inconceivable fury, after camping on foul pilgrim grounds and drinking polluted water. Men previously healthy dropped down by dozens, and those less severely affected were generally past recovery in 24 hours. Besides those who had died there were 500 on the sick list on the first day, and in two days more nearly 3,000 were affected. This epidemic was carried by returning pilgrims up to Calcutta and down to Madras. Three times 12 or 36 years subsequently the great historical epidemic of 1817 occurred; this proceeded up the Ganges as far as Allahabad, when it was deflected southward to the province of Bundelcund, in which the marquis of Hastings was carrying on war

against the Mahrattas with 90,000 men. Of the natives 10,000 had already died in Allahabad, and many others had joined the army as camp followers, among whom the disease crept about in its usual insidious manner for several days, until a sufficient number of foci of the disease had been developed for it to burst forth with irresistible fury in every direction. The natives deserted in great numbers, and the highways and fields for many miles around were strewed with the bodies of those who had fled with the disease upon them. The encampments and lines of march of the army presented most deplorable spectacles; hundreds of soldiers dropped down in every day's advance, and on every night's halt; so that the whole presented the appearance of successive battle fields and the track of an army retreating under every circumstance of defeat and discomfiture. In two weeks 9,000 men succumbed to the pestilence. A subsidiary force coming up from the south under Col. Adams to coöperate with the marquis of Hastings afforded the second striking instance of a large body of men in high health coming into the pestilential region and falling at once into a wretched state of sickness; 70 cases and 20 deaths occurred on the first day, and many were attacked while loitering for water at contaminated springs and rivulets. Other reinforcements were advancing from Bombay in the southwest, and the course of the disease had long been so regular along the line of much travelled roads and the marches of troops that the Bombay authorities prepared for it when it was many hundreds of miles off. Step by step the disease could be traced marching from town to town and creeping from village to village, by the arrival of persons affected with the disease from places where it was known to prevail. From Bombay it was carried up the Persian gulf to Bushire, the only port of southern Persia, from which it was transported by travellers to Shiraz; was excluded from Ispahan by a rigid quarantine, and deflected east to Yezd; from there north to Teheran, and from thence to Reshd, the principal Persian port on the Caspian sea; and from there both by land and water up to Astrakhan, at the mouth of the Volga, where the disease died out. From Bombay it was also carried up to Bassorah at the head of the Persian gulf, where 18,000 persons died in 18 days; and from there along the rivers Euphrates and Tigris to Bagdad, Damascus, Aleppo, and the Mediterranean coast, where it also faded away in 1821. Every successive epidemic of cholera has always been carried up the Persian gulf from Bombay, Surat, Kurrachee, and other ports on the western coast of India, and thus reached the Mediterranean, Black, and Caspian seas, and neighboring countries, by the so-called Persian gulf route. In the Bombay presidency there are 94 shrines to which large pilgrimages are made, and from which the disease is brought to the seacoast. In India the epidemic of 1817

spread in every direction with the march of armies, pilgrims, merchants, and travellers, often in the face of contrary winds and monsoons, although the speed of its progress was accelerated by favoring winds which forced along vessels containing the disease. It was conveyed south in ships to Ceylon, and south-west to Mauritius, and over to Zanzibar on the east coast of Africa, and from there up to Muscat at the foot of the Persian gulf, in slave ships, and down again southeast to Bombay. It was also carried east to Burmah, Siam, Malacca, Sumatra, Java, Borneo, the Philippine islands, and northeast to Canton in China by ships. This epidemic and that of 1781 were distinctly Juggernaut-pilgrim choleras, and for years after we have a repetition of the old story: "Cholera in Calcutta; the pilgrims at Juggernaut suffering severely."—In 1826 the first indications of another pestilence appeared in the north of India; epidemic cholera broke out at Hurdwar, the great place of pilgrimage at the source of the Ganges, where it first issues from the foot of the Himalaya mountains. A few hundred thousand pilgrims go to Hurdwar every year; more every third year; still more every sixth and ninth years, and fully 3,000,000 assemble every 12th year, and a vaster number every 60th year. From Hurdwar cholera was carried back by the huge caravans which came down to the festival from central Asia, Persia, and Afghanistan, to Cabool. Then the disease advanced over the great northwest central Asiatic caravan route to Balkh, Bokhara, and Khiva, and to Orenburg in Russia; also from Cabool by the north Persian route due west to Herat, Meshed, Teheran, and Reshd, at the foot of the Caspian sea; and from there up to Astrakhan in Russia, both by sea and land. Cholera reached Orenburg on Aug. 26, 1829, and Astrakhan in September. From Orenburg it proceeded due west to Nijni Novgorod and Moscow; and from Astrakhan it advanced step by step up the Volga toward the same places, until the stream which had flowed through central Asia to western Russia and Orenburg formed a junction with that which entered southern Russia from the northern provinces of Persia. From Moscow the disease was distributed all over northern and western Russia, especially to Riga, on the Baltic, from which 60 or 70 English coal vessels fled in haste, carrying the disease to Sunderland and Newcastle in England. At this time the great Polish revolution of 1830-'31 was going on, and Russian troops carried the disease to Warsaw, whence it was conveyed due west to Posen and Berlin, and from there to Hamburg and over to London. After the pestilence had prevailed in England, Ireland, and Scotland, it was carried by 10 or 12 Irish emigrant ships to Quebec in the spring of 1832, and from there up the St. Lawrence and across the lakes to Detroit, where it met the United States troops going to the Black Hawk war. In a short time the whole force sent by way of

the lakes was rendered incapable of taking the field; some were left behind, but the greater part reached Chicago in a most deplorable condition; one company which had been mustered and inspected 14 days before without a man on the sick list, had dropped 47 men out of 78 in that short time; and one regiment lost over 200 men in a week. It was generally believed that the infection was contracted by the soldiers on the steamboats which had been previously engaged in transporting crowds of emigrants westward from Montreal and Quebec; and the army surgeons agreed in asserting that previous to the arrival of these steamboats not a case had been observed in Chicago. It was distributed to all the national posts and forts in the extreme west, especially to Fort Dearborn at Chicago, Fort Crawford near Prairie du Chien, and Fort Armstrong at Rock Island. From there the pestilence was carried down the Mississippi to New Orleans by October, 1832; and Surgeon General Lawson says, "One fact is certain: no case of cholera occurred in New Orleans until after the arrival of steamboats with cases of cholera on board, and after a number of their passengers had died of it; 6,000 died out of a population of 55,000."—The next great 12-yearly epidemic commenced in lower Bengal in 1841, advanced over India and toward the N. W. provinces; was supplemented by a Hurdwar epidemic in 1843, and was found in Afghanistan in 1844, in Persia and Meshed in 1845, advancing west in 1846 to Teheran, and up between the Black and Caspian seas toward southern Russia, reaching Astrakhan July 30, 1847. But especially it was deflected west to Trebizond and Poti, on the southern and eastern coasts of the Black sea, and from there carried over to Constantinople and Odessa, and up the Danube to Germany, whence it was carried to Holland and England. Toward the close of the year 1848 numbers of German emigrants arrived at Havre, and some of them were carried to New Orleans on the ship Swanton, with 13 deaths from cholera before arrival, and from which six cases were sent on shore. Dr. Fenner says, after the disease had once commenced in New Orleans, almost every vessel and steamer leaving that city had 20 or 30 cases on board; and thus persons having cholera and dying with it were carried to all the landing towns and cities up the Mississippi and Ohio rivers as high up as Cincinnati. From St. Louis it was carried over the emigrant route to San Francisco; more than 1,000 emigrants died on the road, and many Indians who loitered along from curiosity and for the purpose of begging paid a terrible penalty. In the mean while the Austrian, Hungarian, and Russian armies contending in Hungary in the spring and summer of 1849 had become the principal centre and focus of the disease, whence it spread with terrible virulence into Poland and Germany.—The next and last great 12-yearly epidemic commenced in India in April, 1865. By means of railroads and steamboats,

it reached Mecca on the Red sea by May 2; in Alexandria, June 2, cases were frequent; from there it was carried by steamships to Smyrna, Constantinople, and up the Black sea; to Malta, Ancona in Italy; to Marseilles, Gibraltar, Barcelona, Algiers, Tunis; and to Southampton in England by the steamship Poonah by July 10, with 120 cases of cholera by July 24. But more especially the disease was conveyed up through France from Marseilles to Paris and Havre; and emigrant ships quickly transported the disease over to America, principally to New York. From New York it was distributed in 1866 in every direction over the United States, by railroads and steamboats, even as far west as the Smoky Fork river in Kansas; to Forts Riley and Harker, and to the new town of Ellsworth, then only six weeks old, because soldiers, railroad laborers, and others from infected districts brought the disease to the new line of railroad then building.—Thus we have sketched the great route lines of cholera and the great 12-yearly epidemics. The next one, if our theory is correct, will be a Juggernaut one in 1877, supplemented by a Hurdwar cholera in 1879; although the constant intercourse of Russia with central Asia, and her expeditions in Turkistan, may be the means of introducing a lesser epidemic into Europe, as they are doing at the present time. But in 1877 and 1879 we may expect an outburst of the disease, such as there was in 1781 and 1783, 1817 and 1819, 1829 and 1831, 1841 and 1843, 1853 and 1855, and 1865 and 1867. As Hindostan, in which cholera always originates, lies to the east and south of Europe and North America, the prevailing direction in which the disease always advances is to the west and north; but as it always proceeds along the lines of the greatest and most rapid travel, it often doubles back upon itself. Thus in 1832 it was carried south from England to Holland and France, down to Marseilles; east to Italy, up toward Vienna, and south to Malta toward Alexandria; also down to Spain and back through the Mediterranean. In 1841 and 1842 it was carried by English troops from India to China, back toward Burmah, central Asia, and Bokhara, south into Hindostan as far as the mouth of the Indus, and low down the Ganges. In the Crimean war it was carried east from France and Algiers to Turkey. In 1865 it was taken from Alexandria to Constantinople, from there across the Black sea to Trebizond, Circassia, and Armenia, toward Persia. In our next contests with the disease our whole safety lies in quarantine and thorough disinfection. Bokhara, the holy city of central Asia; Meshed, the holy city of Persia; Mecca, the holy city of Arabia; and the huge pilgrimages to and from them, are the first great outposts of danger. Next come the great distributing ports of Alexandria, Trebizond, Poti, Astrakhan, and Orenburg; next Constantinople, Odessa, and the Baltic ports; next Marseilles, Havre, and Liverpool; finally

our Atlantic ports. The disease can be stopped at any one of these outlets and inlets. It has never yet been carried across the Pacific; but with the vast increase of our Pacific commerce with China and Japan, it must sooner or later reach California from that direction.—As all the most virulent epidemics, from Hurdwar to London, have been connected with the contamination of drinking water by cholera evacuations, there is but little danger of a very extensive outbreak of the disease in any city where the drinking water is originally pure and is conveyed in close and clean pipes. Water sources must be zealously guarded; and it should be regarded as a penal offence; always to be followed by prompt and severe punishment, to foul the tributaries of a stream furnishing drinking water to any community. Cholera pollution of wells, springs, fountains, pumps, and small streams is only too common in all parts of the world, and is the most productive source of severe local outbreaks of the disease, and may always be suspected in every instance in which many cases occur simultaneously in one house, family, or neighborhood. There is even reason to believe that pure drinking water may become contaminated if left standing long in cholera wards, in open vessels; at least, a substance as virulent as croton oil has been condensed from the atmosphere of close and crowded cholera rooms. The ingestion of this water is vastly more fatal than the use of bad fruits or poor liquors; but its dangers may generally be prevented by simple boiling, or filtering through charcoal, or by adding a few grains of permanganate of potash. With these precautions cholera patients may be attended with great safety, provided the nurses be kept scrupulously clean, and no cups, plates, or drinking vessels be touched with soiled hands. Dust inhaled from cholera-soiled clothes, carpets, or floors is the next most dangerous substance; but the effect of this is confined to single rooms, houses, families, and confined spaces, and can never rise to the dignity of the cause of a great and extended epidemic. As the poison of the disease always proceeds from the cholera evacuations, these should be disinfected instantly and thoroughly; and common salt is perhaps as good a disinfectant as any. Strong solutions of salt, or weaker ones of sulphate of iron (copperas) or sulphate of zinc (white vitriol), 1 part to 10 of water, should be kept in the bed pans or vessels; soiled bed and body clothes should be put, before removal from the sick room, into a disinfecting solution of salt, chloride of soda, weak carbolic acid, permanganate of potash, or chloralum, and then subjected to careful washing out of doors. The floor of the sick room should always be bare of carpets, and may be sprinkled or washed with a strong solution of salt or chloralum, or the chloride of aluminum, all of which possess several advantages. They are not poisonous, are inodorous, and are very cheap. They prevent decomposition and re-

move the fætor of most animal discharges, either natural or the products of disease. They deodorize sewage, and may be used for the disinfection of rooms, and as a cleansing material for floors or furniture (2½ ounces to a gallon of water). But, not being volatile, they must be aided by ærial and diffusible disinfectants, the best of which are chlorine, iodine, and carbolic acid. The unpleasant odor of chloride of lime or soda may be overcome by the addition of a small quantity of nitro-benzole. Iodine placed in saucers in different parts of the sick room evaporates spontaneously; and if its odor can be detected, it is in sufficient quantity to disinfect the air. Or ½ lb. of carbolic acid may be mixed with 10 lbs. of wet sand, placed in shallow vessels in various parts of the room, and renewed when its odor has disappeared. It will be seen that the attempt to obtain a disinfectant of universal application, and capable of fulfilling every indication, will always be attended with disappointment. Some, like the chloride of soda and the sulphates of iron and zinc, prevent fermentation and putrefaction; others, like iodine, chlorine, and carbolic acid, resolve the products of decay and decomposition into harmless substances.—Although the first stage of cholera cannot be distinguished from a profuse watery diarrhoea, the treatment is very simple. In the first place, it should be fully believed that nine tenths of all cases of diarrhoea occurring in the summer season, even in cholera times, are not Asiatic cholera, and never will be. Even if the case be one of cholera, absolute repose in bed, between thin blankets, will cure at least one half of all cases without any medicine; then one or two grains of sulphate of iron, with or without a quarter or half a grain of opium, every two or four hours, will cure a great many more. In the severest and most neglected cases no treatment is of any avail; but from 5 to 20 per cent. of these will recover if not too much interfered with. The preventive measures are equally simple. As drinking cholera water is almost the only cause, a rather free use of salt and vinegar, which are the great domestic disinfectants, may be all that is essential. It is certainly unnecessary to abstain from ripe and good fruits and vegetables, while all sweet, fresh meats and farinaceous substances are beneficial. Even of those persons who swallow water into which cholera dejecta have found their way, all with healthy stomachs, containing healthy acid gastric juice, and food in the process of normal digestion, will escape. In some instances 15 out of 20 have escaped. But if cholera water be swallowed on an empty stomach some hours after taking food, then the cholera poison will set up its distinctive changes in the epithelium of the stomach, which speedily extend to that of the intestines, so that a robust, healthy, and otherwise prudent person may quickly succumb to the disease. Or, if more of such water be swallowed than the stomach will easily con-

tain, some of it will at once pass to the small intestines, and their contents being alkaline, the specific action of cholera matter will at once take place. Hence persons with weak digestion, and those suffering from depression of the nervous force, whether following excessive fatigue or a debauch, are especially apt to be attacked. Therefore the poor of large towns, who are ill fed and suffer from want of a healthy acid secretion from the gastric walls, are especially liable to the disease. Hard drinkers increase their risk by drinking large quantities of water after a debauch, to quench their unnatural thirst. But even all these will escape if they be fortunate enough not to drink foul cholera water.—The pathology of the disease is equally simple. The cholera poison first produces a paralysis of the vaso-motor nerves and capillaries of the stomach and bowels, allowing the watery particles of the blood to exude as if from a relaxed and sweating skin. Next, the epithelium of the gastro-intestinal mucous membrane is shed in large quantities, leaving the latter bare and almost raw, red, and filled with blood. In this stage strong stimulants and irritants are very injurious, while a few teaspoonfuls of arrowroot with a little brandy, given very frequently, will prove quite beneficial; and sweet oil and lime water is far better than castor oil, or other so-called eliminatives. As the disease advances the blood is drained of much of its serum or water, becomes thick, and stagnates in various places. It is no longer properly oxygenated, and becomes dark, marking the third stage of the disease, followed by exhaustion and perfect collapse; from which a small number may slowly rally, if carefully supplied with drink and weak stimulants in small quantities, frequently repeated. Of these, some will pass into a typhoid state, through retention of effete materials in the blood, especially of urea, from complete inaction of the kidneys. Then diuretics, more particularly nitre, cantharides, digitalis, or nuxvomica, will save a small proportion. The great point in the whole course of the disease is not to be too hurried or agitated, nor too anxious to do too much and too quickly. Absolute rest and warmth, the careful use of food and weak stimulants, aided by small quantities of astringents and opiates, especially vinegar of opium, with an absence of all unmanly haste and fear, will save a large number who would fruitlessly rely upon vaunted specifics. Dr. Macpherson, who had seen and treated thousands of cases, when attacked himself at night, remained quietly in bed, took nothing but a little arrowroot and brandy with a few drops of laudanum, and occasional sips of carbonic acid water. In the morning he directed that an old and experienced medical friend should not be sent for until after he had finished his breakfast, and the usual time for going on his rounds had arrived. With these simple means, and the careful handling of an old and tried hospi-

tal steward, he was saved when on the borders of a profound collapse, and slowly and steadily brought back to life. All three of these wise and patient men were convinced that the more there was of haste, the more profusely food, stimulants, and drugs were plied, the more certainly fatal would be the result; and that the more steadily and quickly their few and simple means were used, the greater would be the chances of recovery. When he was cold and almost pulseless, and so exhausted as scarcely to be able to raise a finger or move his head, his courage did not fail him; and his skilled and wise attendants did not kill him with mistaken zeal and kindness.

CHOLESTERINE (Gr. *χολή*, bile, and *στερεός*, firm, solid), or **Biliary Fat**, a non-nitrogenized organic substance, found in the bile and in other fluids or situations in the human body, or that of animals in which the biliary secretion is prominent, this substance when separately obtained having the appearance of spermaceti, and differing from ordinary fats only in the fact that it refuses to form a soap with caustic alkalies, even under the action of prolonged heat. Cholesteroline is neutral, inodorous, insoluble in water, soluble in ether and hot alcohol. Its composition is usually represented by the formula $C_{25}H_{42}O$. It is combustible and burns with a bright flame. It crystallizes in very thin, colorless, transparent, rhomboidal plates, frequently marked by a cleavage at one corner in a line parallel with the corresponding side, and often forming in layers, the borders of the subjacent plates showing very distinctly through those above. Cholesteroline was discovered in 1782, by Poulletier de la Salle, in biliary calculi; its presence in the blood was shown in 1830 by Denis. In a condition of health, cholesteroline exists in the bile, blood, liver, brain and nerves, and the crystalline lens. It is also found in very large quantity in the meconium, in the feces of animals hibernating, and by some authorities it is said also in the feces generally in health. It occurs frequently as a morbid deposit or product. Biliary calculi consist wholly of cholesteroline, coloring matter, and mucus. The tablets of cholesteroline are found in or obtained from cancerous growths, encysted tumors, and atheromatous deposits in the coats of the arteries, and sometimes as forming distinct deposits or tumors in the substance of the brain. Cholesteroline is obtained also from the fluid of hydrocele, of ovarian cysts, of tubercle in the crude state, and from pus. Its quantity in the normal fluids is small, forming, according to Berzelius, 1 part in 1,000 of the bile in man, and according to Prof. Austin Flint, jr., of New York, only .618 in 1,000. The analyses of the latter give as the proportion in 1,000 parts, for the venous blood of the male, .445 to .751; for the meconium, 6.245; for the human brain (in two instances in which death was sudden), 7.729 to 11.456. The bile and some other fluids can hold the cholesteroline in

solution, though by aid of what other constituent is not known; while it may perhaps exist, in organic union with other components, in the nervous substance and the crystalline lens. While the chemical relations of cholesteroline had been fully studied, its physiological relations long remained in doubt, or the subject at the most of conjecture. According to the researches of Prof. Flint, cholesteroline is constantly forming in the system, being always present in the nervous matter and the blood, but by far the most abundant in the former; it is a necessary product of the waste of the nervous matter, and being removed thence in the circulation constitutes one of the most important of the materials to be excreted from the body. It is separated from the blood by the liver, appears constantly in the bile, and in this is poured into the alimentary canal. As in the case of urea, the most important excreted matter of the kidneys, so with cholesteroline, if its separation and removal through the liver ceases, or is not in due amount, this product accumulates in the system, producing its form also of poisoning or deterioration of the blood, and leading to a corresponding class of diseases. Thus the bile has two distinct functions answering to the presence of two entirely distinct components in it. One of these embraces the glyco-cholate and tauro-cholate of soda, which do not preëxist in the blood, and so do not accumulate in it when the liver is torpid or its action arrested; these are produced in the liver, serve a useful purpose in completing the process of digestion, are not discharged in the feces, and constitute a secretion only. The other function of the liver is the depuration of the blood by freeing it of excess of cholesteroline; and to this end probably it is that secretion of bile continues in the intervals of digestion, though more abundant during the digestive acts. The ordinary feces, according to Prof. Flint, do not contain cholesteroline, but contain stercorine; the substance thus named by the author being invariably found by him in the normal feces, and regarded by him as identical with that previously found in minute quantity (.02 to .025 part in 1,000) in blood, and named seroline. The transformation of cholesteroline to stercorine occurs during the digestive process; and that it does not take place before digestion commences, nor when it is for the time arrested, accounts for the presence of the former only in the meconium and the excrement of animals hibernating. Stercorine is therefore the form in which cholesteroline is discharged from the body. The facts explain the distinction of the two types of jaundice. In the mild type the bile is formed, but its discharge being obstructed, its coloring matter chiefly is reabsorbed, and the disease is attended with yellowness of the skin, but is comparatively harmless; in the other, the grave symptoms and almost invariably fatal character are due to cessation of the action of the liver, with retention of choleste-

